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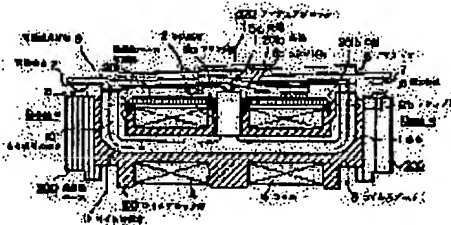
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(54) POLAR ELECTROMAGNETIC RELAY

(57)Abstract:

PROBLEM TO BE SOLVED: To improve the insulating property between a coil and respective parts and provide a polar electromagnetic relay with miniaturized size having high breakdown voltage and low electric consumption by forming a gap or a recessed part in a flange part of a coil spool and forming a projected part in a shielding part on the opposite to the gap of the recessed part.

SOLUTION: A flange part 12a into which a permanent magnet 2 is inserted is formed to have a tapered structure and the magnet 2 is of an insulator coil spool 3 unitedly formed as to cover a U-shaped iron core 1. A projected part 201a is formed in a shielding part 201 which electrically insulates the magnet 2 on the opposite to the recessed part and a coil 4. Consequently, the distance along the faces of the coil 4 and the magnet 2 becomes long. Moreover, recessed parts are formed in flange parts 12b in both poles of the iron core 1 and projected parts 201b are formed in the shielding part 201 on the opposite to the recessed parts. As a result, the distance along the faces of the coil 4 and the iron core 1 can be extended. The withstand voltage between the coil 4 and contact points 7, 8 can be heightened.



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CLAIMS

[Claim(s)]

[Claim 1] An iron core with the character type cross section of KO, the coil wound around the surroundings of this iron core, and the permanent magnet of the shape of a rectangular parallelepiped which fixed the end to the flat surface of the center section of said iron core, With the seesaw mold amateur who consists of tabular magnetic material arranged so that the two poles on which a self center section is supported by the top face of this permanent magnet, and said iron core counters both ends may be contacted In the owner pole type electromagnetic relay which consists of a traveling contact spring which is supported by this seesaw mold amateur's both sides, and has a traveling contact to both ends, and a stationary contact arranged in the location where this traveling contact counters It has the covered section which consists of an insulator between said coil, said seesaw mold amateur, and said traveling contact spring. The coil spool which consists of an insulator really fabricated so that an iron core with the character type cross section of said KO might be covered, The flange which inserts said permanent magnet has the crevice of a taper configuration, and heights are prepared in said covered section which insulates a coil with a permanent magnet electrically so that this crevice may be countered. And the owner pole type electromagnetic relay characterized by preparing heights in said covered section which insulates an iron core and a coil so that a crevice may be formed in the flange of the two poles of said iron core and this crevice may be countered.

[Claim 2] The owner pole type electromagnetic relay according to claim 1 characterized by having established the opening between said permanent magnets in said permanent magnet of said coil spool, and the flange which counters, having prepared heights in said covered section which insulates a permanent magnet and a coil so that this opening section might be countered, and preparing heights in said covered section which insulates an iron core and a coil so that the opening section may be formed in the flange of the two poles of said iron core and this opening section may be countered.

[Claim 3] The owner pole type electromagnetic relay according to claim 1 characterized by having prepared taper structure in said permanent magnet of said coil spool, the flange which counters, and this base electric shielding section that counters this flange, having been filled up with the insulating resin encapsulant for insulating said permanent magnet and said coil to the opening of this flange and this covered section, and making it harden at an elevated temperature.

[Claim 4] The owner pole type electromagnetic relay according to claim 1, 2, or 3 which said covered section contains said coil spool inside, and is characterized by being some insulator

bases to fix.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[Field of the Invention] Especially this invention relates to an owner pole type electromagnetic relay with a seesaw balance amateur mold magnetic circuit about an electromagnetic relay.

[0001]

[Description of the Prior Art] Drawing 7 is the sectional view showing the structure of the conventional owner pole type electromagnetic relay. First, the coil 4 which makes the coil spool 3 which consists of a really fabricated insulator generate the magnetomotive force of a relay is rolled so that the iron core 1 with the cross section of the typeface of KO may be covered, the rectangular parallelepiped-like permanent magnet 2 is fixed to flange 12a which inserts the permanent magnet 2 prepared in the flat surface of the center section of the above-mentioned iron core 1, and the coil block object 100 is constituted. Next, the above-mentioned coil block object 100 is inserted in the insulator base 200 of the cube type with which the bottom opened the fixed-end child, neutral terminal, and coil derivation terminal which fixed the stationary contact 8, and this insulator base 200 from the bottom, and it fits into them. After fitting in the insulator base 200 and the above-mentioned coil block object 100, amateur Brock 300 who really fabricated the traveling contact spring 6 equipped with a traveling contact 7 and hinge spring section 6a with the insulator is stationed so that projection 5a of this amateur's 5 self center section may come to the center section of the above-mentioned permanent magnet 2, and both ends may contact further the two poles on which said iron core 1 counters. Stationed amateur Brock 300 is fixed by the approaches of hinge spring 6a and a neutral terminal, such as welding. The covered section 201 has secured the electric insulation with a coil 4, and a traveling contact 7, the traveling contact spring 6, amateur 5, a permanent magnet 2 and an iron core 1 while the insulator base 200 contains and fixes the coil block object 100 to the interior.

[0002] Next, drawing 7 explains the principle of operation of the conventional owner pole type electromagnetic relay. The continuous-line arrow head of drawing 7 expresses the magnetic flux 10 in the deenergisation condition of a coil 4 produced from a permanent magnet 2. In the condition that a coil 4 is not excited, amateur 5 is attracted at the magnetic pole section by the side of a break (Break) (normally-closing side), and is in contact with the stationary contact 8 which the traveling contact 7 by the side of a break counters with the bending force of hinge spring section 6a connected with the traveling contact spring 6. At this time, the magnetic flux 10 generated from a permanent magnet 2 flows to a permanent magnet 2 mainly through the amateur 5 by the side of a break, and an iron core 1. If excitation power is impressed so that the magnetic flux 10 of a permanent magnet 2 may be negated in the coil section 4 of this magnetic circuit, with a coil, the magnetic flux 11 produced in the character type iron core 1 of KO negates magnetic flux 10, and further, when magnetic flux 11 overcomes, an iron core 1 will be tilted focusing on supporting-point 5a, and will be reversed to the Make side (normally open

side).

[0003] In the conventional owner pole type electromagnetic relay shown in this drawing 7, the coil 4 by the side of primary, the contact 7 of a secondary, and the insulating property between eight are decided by the creeping distance of coil 4 edge, permanent magnet 2, or coil 4 edge and an iron core 1, and an insulating property becomes better [what has the longer creeping distance]. The creeping distance (distance for insulation) of this permanent magnet 2 and iron core 1, and coil 4 serves as the shortest by opening in the both ends of the insulator base 200, and is decided by the configuration of the target coil spool 3, and the configuration of the insulator base 200.

[0004] By general electromagnetic relays other than a seesaw balance mold, the approach of the whole coil being covered with a secondary Plastic solid, the level difference section being prepared, it fitting in, and fused junction being carried out to the part of the flange of this secondary Plastic solid after that, and securing insulation is indicated as the coil insulation approach like publication of unexamined utility model application Heisei 2-5852 or publication of unexamined utility model application Heisei 3-13703 to raise a coil 4, a contact 7, and the insulating withstand voltage between eight.

[0005] Moreover, in the example of publication of unexamined utility model application Showa 62-142141 or publication of unexamined utility model application Heisei 4-33244, the space part between a coil and a contact is covered with coil covering of an insulator, and the approach of raising insulation is indicated.

[0006] Furthermore, in JP,62-14839,A, the whole coil is covered with insulator resin and the approach which is going to enlarge the creeping distance is indicated.

[0007] As an owner pole type electromagnetic relay with seesaw balance mold amateur structure, although shown in JP,57-15327,A, it is a different configuration in that the path of insertion to the base of a coil block object is not shown, and the covered section does not exist between a coil and a contact, for example.

[0008]

[Problem(s) to be Solved by the Invention] It is necessary to raise coil resistance, and in order to lower power consumption, in an owner pole type electromagnetic relay with seesaw balance mold amateur structure, it is necessary to increase the number of coiling and to increase the coil volume for that purpose. If the coil volume is increased, between a coil and a contact, the creeping distance between a coil, a permanent magnet, an iron core, and amateur will specifically become short, and the insulating withstand voltage between the coil by the side of primary and the contact of a secondary will fall. Moreover, as well as the above when it miniaturizes an owner pole type electromagnetic relay, the creeping distance between a coil, a permanent magnet, an iron core, and amateur becomes short, and there is a problem that the insulating withstand voltage between coil-contacts falls similarly.

[0009] the purpose of this invention -- a coil, a permanent magnet, an iron core, and the insulating property between amateur -- improving -- small and a low power -- it is -- more -- high -- it is in offering an owner pole type electromagnetic relay [****].

[0010]

[Means for Solving the Problem] The owner pole type electromagnetic relay concerning this invention has the following descriptions.

(1) An iron core with the character type cross section of KO, and the coil wound around the surroundings of this iron core, With the seesaw mold amateur who consists of tabular magnetic material arranged so that the two poles on which a self center section is supported by the top face of the permanent magnet of the shape of a rectangular parallelepiped which fixed the end to the flat surface of the center section of said iron core, and this permanent magnet, and said iron core counters both ends may be contacted In the owner pole type electromagnetic relay which consists of a traveling contact spring which is supported by this seesaw mold amateur's both sides, and has a traveling contact to both ends, and a stationary contact arranged in the location where this traveling contact counters It has the covered section which consists of an insulator between said coil, said seesaw mold amateur, and said traveling contact spring. The coil spool which consists of an insulator really fabricated so that an iron core with the character type

cross section of said KO might be covered, The flange which inserts said permanent magnet has the crevice of a taper configuration, and heights are prepared in said covered section which insulates a coil with a permanent magnet electrically so that this crevice may be countered. And a crevice is formed in the flange of the two poles of said iron core, and it is characterized by preparing heights in said covered section which insulates an iron core and a coil so that this crevice may be countered.

In an owner pole type electromagnetic relay given [said] in 1 term (2) Said coil spool, The opening between said permanent magnets is established in said permanent magnet and the flange which counters. Heights are prepared in said covered section which insulates a permanent magnet and a coil so that this opening section may be countered, and the opening section is formed in the flange of the two poles of said iron core, and it is characterized by preparing heights in said covered section which insulates an iron core and a coil so that this opening section may be countered.

(3) In an owner pole type electromagnetic relay given [said] in 1 term, taper structure is prepared in said permanent magnet of said coil spool, the flange which counters, and this base electric shielding section that counters this flange, and it is filled up with the insulating resin encapsulant for insulating said permanent magnet and said coil to the opening of this flange and this covered section, and is characterized by making it harden at an elevated temperature.

(4) In an owner pole type electromagnetic relay said 1 and 2, and given in 3 terms, said covered section contains said coil spool inside, and is characterized by being some insulator bases to fix. [0011]

[Embodiment of the Invention] Next, the example of an operation gestalt of this invention is explained with reference to a drawing.

(Example 1 of an operation gestalt) Drawing 1 is the sectional view showing the 1st example of an operation gestalt of the owner pole type electromagnetic relay of this invention. First, a coil 4 is wound around the coil spool 3 which consists of an iron core 1 with the cross section of the typeface of KO, and a really fabricated insulator, the rectangular parallelepiped-like permanent magnet 2 is fixed to the center section of the above-mentioned iron core 1, and the coil block object 100 is constituted. Next, it buries at the insulator base 200 of the cube type with which the bottom opened the fixed-end child, neutral terminal, and coil derivation terminal which fixed the stationary contact 8, and the above-mentioned coil block object 100 is inserted in this insulator base 200 from the bottom, and it fits into it. After this, amateur Brock 300 having the traveling contact spring 6 containing a traveling contact 7 and hinge spring section 6a is stationed so that the two poles on which said iron core 1 counters both ends further in projection 5a of this amateur's 5 self center section at the center section of the permanent magnet 2 may be contacted, hinge spring section 6a and a neutral terminal are fixed by welding, and an owner pole type electromagnetic relay is constituted.

[0012] About the principle of operation of an owner pole type electromagnetic relay, since it is the same as the conventional example of drawing 7, explanation is omitted here.

[0013] In drawing 1, a different point from drawing 7 is the following.

[0014] By the relay which lowered power consumption, as shown in drawing 1, since the volume of a coil 4 increases, the creeping distance between a coil 4, a permanent magnet 2, an iron core 1, and amateur 5 becomes short, and the coil 4 by the side of primary, the contact 7 of a secondary, and the insulating withstand voltage between eight fall. Then, first, in order to lengthen the creeping distance between a coil 4 and a permanent magnet 2, flange 12a which inserts the permanent magnet 2 of the really fabricated insulator coil spool 3 was made into taper structure so that the character type iron core 1 of KO might be covered, and heights 201a is prepared in the base electric shielding section 201 which insulates a coil 4 with the permanent magnet 2 which counters this crevice electrically. Thereby, the creeping distance between a coil 4 and a permanent magnet 2 is long with 26 units in this example of an operation gestalt, if the former is made into 21 units. Moreover, in order to lengthen the creeping distance between a coil 4 and an iron core 1, the crevice was formed in flange 12b of the two poles of an iron core 1, and heights 201b is prepared in the base electric shielding section 201 which counters this crevice. Thereby, the creeping distance between a coil 4 and an iron core 1 is long with 25 units in this

example, if the former is made into 15 units. Consequently, a coil 4, a contact 7, and the insulating withstand voltage between eight improve, as shown in drawing 2.

(Example 2 of an operation gestalt) Drawing 3 is the sectional view showing the 2nd example of an operation gestalt of the owner pole type electromagnetic relay of this invention. In drawing 3, the same sign is given to the same member as drawing 1, and explanation is omitted here. In the 2nd example of an operation gestalt, as shown in drawing 3, in order to lengthen the creeping distance between a coil 4 and a permanent magnet 2, the opening between permanent magnets 2 was established in the permanent magnet 2 of the coil spool 3, and flange 12a which counters, and heights 201a is provided in the base electric shielding section 201 which counters this opening section. Thereby, the creeping distance between a coil 4 and a permanent magnet 2 is long with 29 units in this example of an operation gestalt, if the former is made into 21 units. Moreover, in order to lengthen the creeping distance between a coil 4 and an iron core 1, the opening section was formed in flange 12b of the two poles of an iron core 1, and heights 201b is prepared in the base electric shielding section 201 which counters this opening section. Thereby, the creeping distance between a coil 4 and an iron core 1 is long with 32 units in this example of an operation gestalt, if the former is made into 15 units. Consequently, a coil 4, a contact 7, and the insulating withstand voltage between eight improve, as shown in drawing 4.

(Example 3 of an operation gestalt) Drawing 5 is the sectional view showing the 3rd example of an operation gestalt of the owner pole type electromagnetic relay of this invention. In drawing 5, the same sign is given to the same member as drawing 1, and explanation is omitted here. As shown in drawing 5, in order to lengthen the creeping distance between a coil 4 and a permanent magnet 2 in the 3rd example of an operation gestalt, Taper structure is prepared in the base electric shielding section 201 which counters the permanent magnet 2 of the coil spool 3, flange 12a which counters, and its flange 12a. The opening of this flange 12a and the base electric shielding section 201 is filled up with the insulating resin encapsulant 13 for insulating a coil 4 with a permanent magnet 2, and is stiffened at the elevated temperature around 100 degrees C. Thereby, if the creeping distance between a coil 4 and a permanent magnet 2 makes the former 21 units, in this example, it becomes long with 26 units, consequently a coil 4, a contact 7, and the insulating withstand voltage between eight improve, as shown in drawing 6.
[0015]

[Effect of the Invention] As explained above, the owner pole type electromagnetic relay of this invention A taper or an opening is established in flange 12a which inserts the permanent magnet 2 of the insulator coil spool 3. Heights 201a was prepared in the base electric shielding section 201 which counters this crevice, and heights 201b was prepared in the base electric shielding section 201 which forms a crevice or an opening in flange 12b of the two poles of an iron core 1, and counters this crevice, Furthermore, the permanent magnet 2 of the coil spool 3 and flange 12a which counters, By having prepared taper structure in the base electric shielding section 201 which counters that flange 12a, and having made the opening of this flange 12a and the base electric shielding section 201 fill up with and harden the insulating resin encapsulant 13 the creeping distance between a coil 4, a permanent magnet 2, an iron core 1, and amateur 5 — long — it can carry out — consequently, a coil 4, a contact 7, and the insulating withstand voltage between eight — increasing — small and a low power — more — high — an owner pole type electromagnetic relay [***] can be offered.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The structure section Fig. of an owner pole type electromagnetic relay showing the 1st example of an operation gestalt of this invention.

[Drawing 2] The insulating withstand voltage Fig. of an owner pole type electromagnetic relay showing the 1st example of an operation gestalt of this invention.

[Drawing 3] The structure section Fig. of an owner pole type electromagnetic relay showing the 2nd example of an operation gestalt of this invention.

[Drawing 4] The insulating withstand voltage Fig. of an owner pole type electromagnetic relay showing the 2nd example of an operation gestalt of this invention.

[Drawing 5] The structure section Fig. of an owner pole type electromagnetic relay showing the 3rd example of an operation gestalt of this invention.

[Drawing 6] The insulating withstand voltage Fig. of an owner pole type electromagnetic relay showing the 3rd example of an operation gestalt of this invention.

[Drawing 7] The structure section Fig. of an owner pole type electromagnetic relay showing a conventional example.

[Drawing 8] The insulating withstand voltage Fig. of an owner pole type electromagnetic relay showing a conventional example.

[Description of Notations]

- 1 Iron Core
- 2 Permanent Magnet
- 3 Coil Spool
- 4 Coil
- 5 Amateur
- 6 Traveling Contact Spring
- 6a Hinge spring
- 7 Traveling Contact
- 8 Stationary Contact
- 10 Permanent Magnet Magnetic Flux
- 11 Coil Magnetic Flux
- 12a Permanent magnet side flange
- 12b Iron core side flange
- 13 Insulating Resin Encapsulant
- 100 Coil Block Object
- 200 Insulator Base
- 201 Insulator Base Electric Shielding Section
- 201a Permanent magnet side heights
- 201b Iron core side heights
- 300 Amateur Brock

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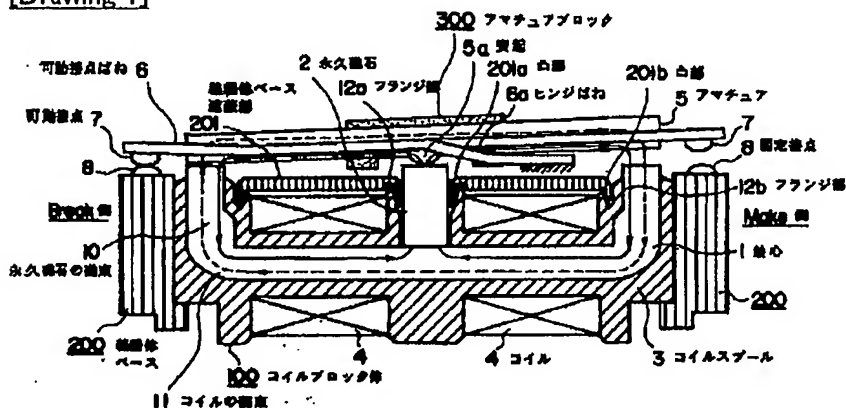
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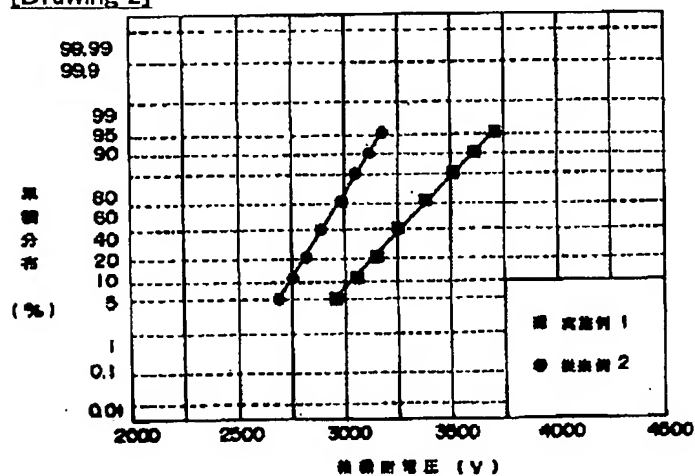
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DRAWINGS

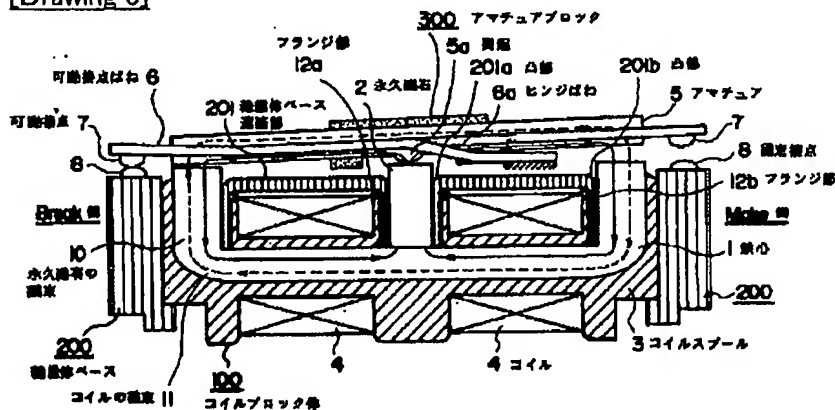
[Drawing 1]



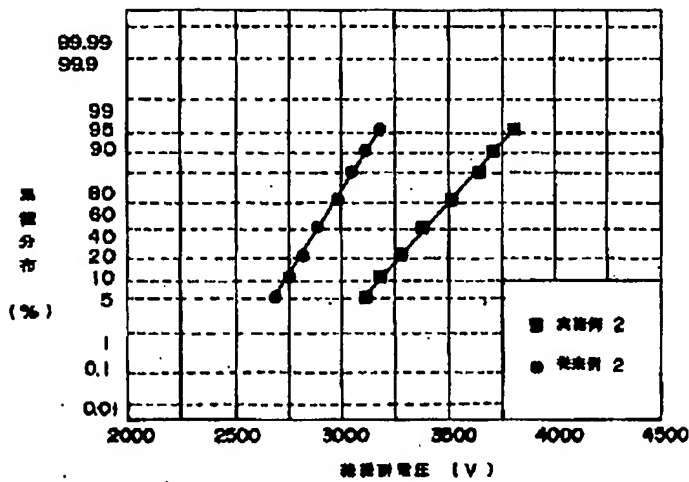
[Drawing 2]



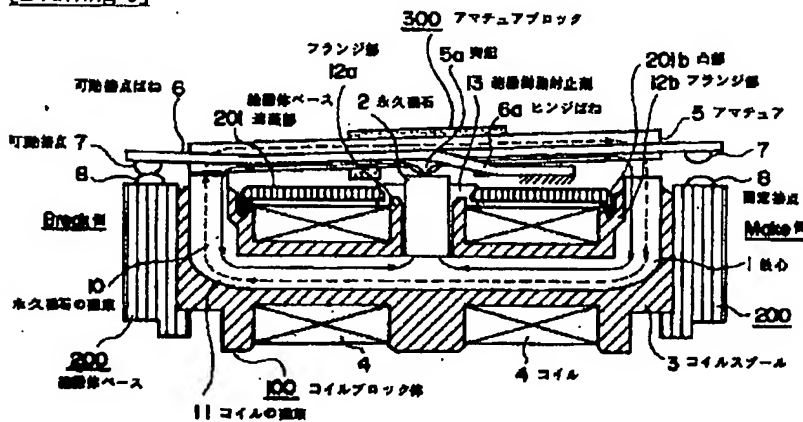
[Drawing 3]



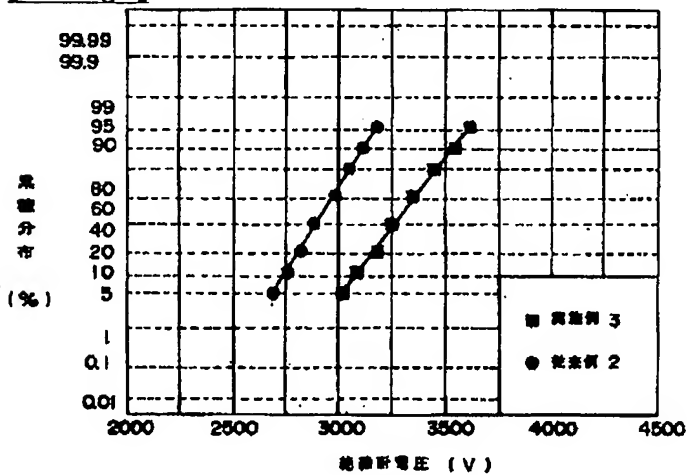
[Drawing 4]



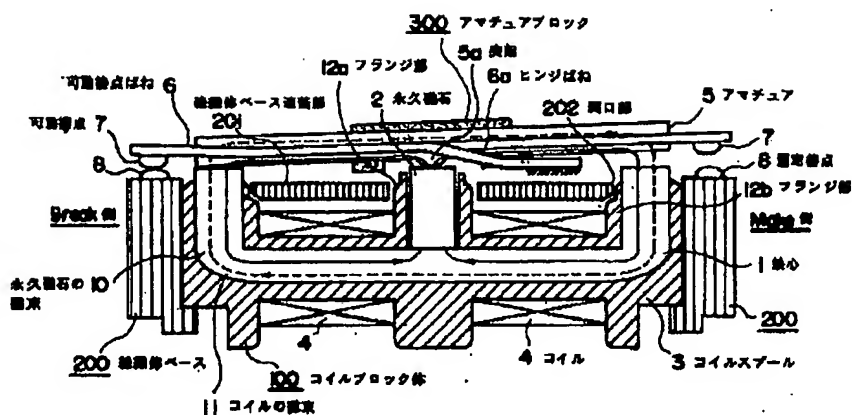
[Drawing 5]



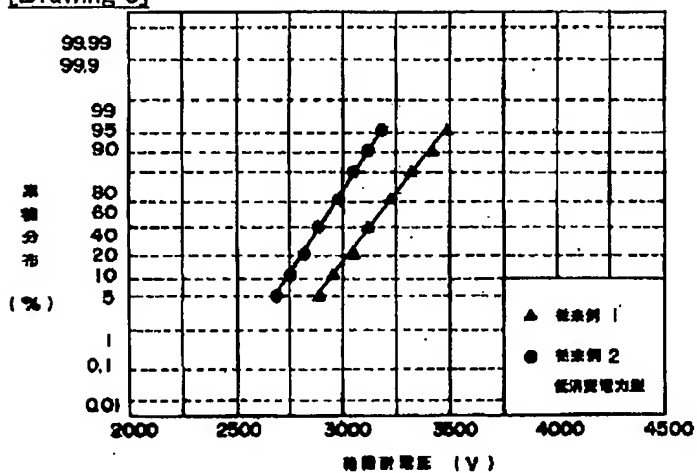
[Drawing 6]



[Drawing 7]



[Drawing 8]



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(54) 【発明の名称】 有極型電磁リレー

(57) 【要約】

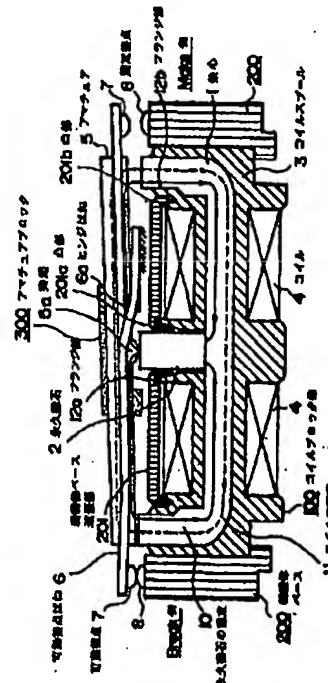
【課題】 本発明の目的は、コイルと永久磁石、鉄心、アマチュア間の絶縁特性を改善し、小形かつ低消費電力で、より高耐圧な有極型電磁リレーを提供することにある。

【解決手段】 本発明の有極型電磁リレーは、以下の3つの構成により、コイルと永久磁石、鉄心、およびアマチュア間の沿面距離を長くしている。

(1) スプールの永久磁石側のフランジ部にテーパ構造を設け、かつ、鉄心の両極のフランジ部に凹部を形成し、この両部に対向するベース遮蔽部に凸部を設けた。

(2) スプールの永久磁石側のフランジ部に空隙部を設け、かつ、鉄心の両極のフランジ部に空隙部を形成し、この両空隙部に対向するベース遮蔽部に凸部を設けた。

(3) スプールの永久磁石側のフランジ部と、そのフランジ部に対向するベース遮蔽部にテーパ構造を設け、そのテーパ部の空隙に、絶縁樹脂封止剤を充填し、高温で硬化させた。



【特許請求の範囲】

【請求項1】 コの字型の断面を持つ鉄心と、該鉄心の回りに巻いたコイルと、前記鉄心の中央部の平面に一端を固定した直方体状の永久磁石と、該永久磁石の上面に自己の中央部を支持され、両端を前記鉄心の対向する両極に当接するよう配置された板状の磁性材からなるシーソー型アマチュアと、該シーソー型アマチュアの両側に支持され、かつ両端に可動接点を有する可動接点ばねと、該可動接点の対向する位置に配置された固定接点とからなる有極型電磁リレーにおいて、前記コイルと前記シーソー型アマチュアおよび前記可動接点ばねとの間に絶縁体からなる遮蔽部を備え、前記コの字型の断面を持つ鉄心を覆うように一体成形された絶縁体からなるコイルスプールの、前記永久磁石を挿入するフランジ部がテーパ形状の凹部を持ち、この凹部に対向するよう永久磁石とコイルを電気的に絶縁する前記遮蔽部に凸部を設け、かつ、前記鉄心の両極のフランジ部に凹部を形成し、この凹部に対向するよう鉄心とコイルを絶縁する前記遮蔽部に凸部を設けたことを特徴とする有極型電磁リレー。

【請求項2】 前記コイルスプールの、前記永久磁石と対向するフランジ部に前記永久磁石との間の空隙を設け、該空隙部に対向するよう永久磁石とコイルとを絶縁する前記遮蔽部に凸部を設け、かつ、前記鉄心の両極のフランジ部に空隙部を形成し、該空隙部に対向するよう鉄心とコイルを絶縁する前記遮蔽部に凸部を設けたことを特徴とする請求項1記載の有極型電磁リレー。

【請求項3】 前記コイルスプールの、前記永久磁石と対向するフランジ部と、該フランジ部に対向する該ベース遮蔽部にテーパ構造を設け、該フランジ部と該遮蔽部との空隙に、前記永久磁石と前記コイルを絶縁するための絶縁樹脂封止剤を充填し、高温で硬化させたことを特徴とする請求項1記載の有極型電磁リレー。

【請求項4】 前記遮蔽部が前記コイルスプールの内部に収納し、固定する絶縁体ベースの一部であることを特徴とする請求項1、2または3記載の有極型電磁リレー。

【発明の詳細な説明】

【発明の属する技術分野】本発明は、電磁リレーに関し、特にシーソーバランスアマチュア型磁気回路を持つ有極型電磁リレーに関する。

【0001】

【従来の技術】図7は、従来の有極型電磁リレーの構造を示す断面図である。まず、コの字形の断面を持つ鉄心1を覆うように一体成形された絶縁体からなるコイルスプール3に、リレーの起磁力を発生させるコイル4を巻き、上記鉄心1の中央部の平面に設けられた永久磁石2を挿入するフランジ部12aに直方体状の永久磁石2を固定してコイルブロック体100を構成する。次に、固定接点8を固着した固定端子、中立端子およびコイル導

出端子を下側が開いた箱形の絶縁体ベース200、この絶縁体ベース200に上記コイルブロック体100を下側から挿入し、嵌合する。絶縁体ベース200と上記コイルブロック体100を嵌合したのち、可動接点7およびヒンジばね部6aを備えた可動接点ばね6を絶縁体によって一体成形したアマチュアブロック300を、このアマチュア5の自己の中央部の突起5aが上記永久磁石2の中央部に来るように、さらに、両端が前記鉄心1の対向する両極に当接するように配置する。配置されたアマチュアブロック300は、ヒンジばね6aと中立端子との溶接などの方法により固定される。絶縁体ベース200は、コイルブロック体100を内部に収納、固定すると共に、遮蔽部201は、コイル4と、可動接点7、可動接点ばね6、アマチュア5、永久磁石2、および、鉄心1との電気的な絶縁を確保している。

【0002】次に、従来の有極型電磁リレーの動作原理を図7により説明する。図7の実線矢印は、コイル4の無励磁状態における、永久磁石2より生ずる磁束10を表している。コイル4が励磁されない状態では、可動接点ばね6に連結されたヒンジばね部6aの曲げ力により、アマチュア5はブレイク（Break）側（常閉側）の磁極部に吸引され、ブレイク側の可動接点7が対向する固定接点8に接触している。この時、永久磁石2より発生する磁束10は、主としてブレイク側のアマチュア5、鉄心1を通して永久磁石2に流れる。この磁気回路のコイル部4に永久磁石2の磁束10を打ち消すように励磁電力を印加すると、コイルにより、コの字型の鉄心1に生じる磁束11が磁束10を打ち消し、さらに、磁束11が打ち勝ったとき、鉄心1は支点5aを中心に傾動してMake側（常開側）に反転する。

【0003】この図7に示す従来の有極型電磁リレーにおいては、1次側のコイル4と2次側の接点7、8間の絶縁特性は、コイル4端部と永久磁石2またはコイル4端部と鉄心1との沿面距離で決まり、沿面距離が長いもののほど、絶縁特性が良好となる。この永久磁石2および鉄心1とコイル4との沿面距離（絶縁距離）は、絶縁体ベース200の両端部における開口部で最短となり、対象となるコイルスプール3の形状および絶縁体ベース200の形状で決まる。

【0004】コイル4と接点7、8間の絶縁耐電圧を高めたいとき、シーソーバランス型以外の一般的な電磁リレーでは、コイル絶縁方法として、例えば、実開平2-5852や実開平3-13703のように、コイル全体を2次成形体で覆い、この2次成形体のつばの部分に段差部を設けて嵌合し、その後、溶融接合して絶縁性を確保しようとする方法が開示されている。

【0005】また、実開昭62-142141や実開平4-33244の例では、コイルと接点間の空間部分を絶縁体のコイルカバーで覆い、絶縁性を高める方法が開示されている。

【0006】さらに、特開昭62-14839では、コイル全体を絶縁体樹脂で被覆し、沿面距離を大きくしようとする方法が開示されている。

【0007】シーソーバランス型アマチュア構造を持つ有極型電磁リレーとしては、例えば、特開昭57-15327に示されているが、コイルブロック体のベースへの挿入方向が示されておらず、コイル、接点間に遮蔽部が存在しない点で異なる構成である。

【0008】

【発明が解決しようとする課題】シーソーバランス型アマチュア構造を持つ有極型電磁リレーにおいて、消費電力を下げるためには、コイル抵抗を上げる必要があり、そのためには、コイル巻き数を増やして、コイル体積を増加する必要がある。コイル体積を増加すると、コイルと接点間、具体的にはコイルと永久磁石、鉄心、およびアマチュア間の沿面距離が短くなり、1次側のコイルと2次側の接点間の絶縁耐電圧が低下する。また、有極型電磁リレーを小形化する場合も、上記と同様に、コイルと永久磁石、鉄心、およびアマチュア間の沿面距離が短くなり、同様にコイル-接点間の絶縁耐電圧が低下するという問題がある。

【0009】本発明の目的は、コイルと永久磁石、鉄心、およびアマチュア間の絶縁特性を改善し、小形かつ低消費電力で、より高耐圧な有極型電磁リレーを提供することにある。

【0010】

【課題を解決するための手段】本発明に係わる有極型電磁リレーは、以下の特徴を持つ。

(1) コの字型の断面を持つ鉄心と、該鉄心の回りに巻いたコイルと、前記鉄心の中央部の平面に一端を固定した直方体状の永久磁石と、該永久磁石の上面に自己の中央部を支持され、両端を前記鉄心の対向する両極に当接するよう配置された板状の磁性材からなるシーソー型アマチュアと、該シーソー型アマチュアの両側に支持され、かつ両端に可動接点を有する可動接点ばねと、該可動接点の対向する位置に配置された固定接点とからなる有極型電磁リレーにおいて、前記コイルと前記シーソー型アマチュアおよび前記可動接点ばねとの間に絶縁体からなる遮蔽部を備え、前記コの字型の断面を持つ鉄心を覆うように一体成形された絶縁体からなるコイルスプールの、前記永久磁石を挿入するフランジ部がテーパー形状の凹部を持ち、この凹部に対向するよう永久磁石とコイルを電気的に絶縁する前記遮蔽部に凸部を設け、かつ、前記鉄心の両極のフランジ部に凹部を形成し、この凹部に対向するよう鉄心とコイルを絶縁する前記遮蔽部に凸部を設けたことを特徴とする。

(2) 前記1項記載の有極型電磁リレーにおいて、前記コイルスプールの、前記永久磁石と対向するフランジ部に前記永久磁石との間の空隙を設け、該空隙部に対向するよう永久磁石とコイルとを絶縁する前記遮蔽部に凸部

を設け、かつ、前記鉄心の両極のフランジ部に空隙部を形成し、該空隙部に対向するよう鉄心とコイルを絶縁する前記遮蔽部に凸部を設けたことを特徴とする。

(3) 前記1項記載の有極型電磁リレーにおいて、前記コイルスプールの、前記永久磁石と対向するフランジ部と、該フランジ部に対向する該ベース遮蔽部にテーパー構造を設け、該フランジ部と該遮蔽部との空隙に、前記永久磁石と前記コイルを絶縁するための絶縁樹脂封止剤を充填し、高温で硬化させたことを特徴とする。

(4) 前記1、2、3項記載の有極型電磁リレーにおいて、前記遮蔽部が前記コイルスプールの内部に収納し、固定する絶縁体ベースの一部であることを特徴とする。

【0011】

【発明の実施の形態】次に本発明の実施形態例について、図面を参照して説明する。

(実施形態例1) 図1は、本発明の有極型電磁リレーの第1の実施形態例を示す断面図である。まず、コの字型の断面を持つ鉄心1と一体成形された絶縁体からなるコイルスプール3に、コイル4を巻き、上記鉄心1の中央部に直方体状の永久磁石2を固定してコイルブロック体100を構成する。次に、固定接点8を固着した固定端子、中立端子およびコイル導出端子を下側が開いた箱形の絶縁体ベース200に埋め、この絶縁体ベース200に上記コイルブロック体100を下側から挿入し嵌合する。このうち、可動接点7およびヒンジばね部6aを含む可動接点ばね6を備えたアマチュアブロック300を、このアマチュア5の自己の中央部の突起6aを永久磁石2の中央部に、さらに、両端を前記鉄心1の対向する両極に当接するように配置し、ヒンジばね部6aと中立端子とを溶接により固定して、有極型電磁リレーを構成する。

【0012】有極型電磁リレーの動作原理については、図7の従来例と同じため、ここでは説明を省略する。

【0013】図1において、図7と異なる点は以下である。

【0014】図1に示すように、消費電力を下げるリレーでは、コイル4の体積が増加するため、コイル4と永久磁石2、鉄心1、およびアマチュア5間の沿面距離が短くなり、1次側のコイル4と2次側の接点7、8間の絶縁耐電圧が低下する。そこで、まず、コイル4と永久磁石2の間の沿面距離を長くするため、コの字型の鉄心1を覆うように一体成形された絶縁体コイルスプール3の、永久磁石2を挿入するフランジ部12aをテーパー構造にし、この凹部に対向する永久磁石2とコイル4を電気的に絶縁するベース遮蔽部201に凸部201aを設けている。これにより、コイル4と永久磁石2の間の沿面距離は、従来を21単位とすると、本実施形態例では、26単位と長くなっている。また、コイル4と鉄心1の間の沿面距離を長くするため、鉄心1の両極のフランジ部12bに凹部を形成し、この凹部に対向するベ-

ス遮蔽部201に凸部201bを設けている。これにより、コイル4と鉄心1の間の沿面距離は、従来を15単位とすると、本例では、25単位と長くなっている。この結果、コイル4と接点7、8間の絶縁耐電圧は、図2に示すように改善されている。

(実施形態例2) 図3は、本発明の有極型電磁リレーの第2の実施形態例を示す断面図である。図3において、図1と同じ部材には同じ符号が付してあり、ここでは説明は省略する。図3に示すように、第2の実施形態例では、コイル4と永久磁石2の間の沿面距離を長くするため、コイルスプール3の、永久磁石2と対向するフランジ部12aに永久磁石2との間の空隙を設け、この空隙部に対向するベース遮蔽部201に凸部201aを設けている。これにより、コイル4と永久磁石2の間の沿面距離は、従来を21単位とすると、本実施形態例では、29単位と長くなっている。また、コイル4と鉄心1の間の沿面距離を長くするため、鉄心1の両極のフランジ部12bに空隙部を形成し、この空隙部に対向するベース遮蔽部201に凸部201bを設けている。これにより、コイル4と鉄心1の間の沿面距離は、従来を15単位とすると、本実施形態例では、32単位と長くなっている。この結果、コイル4と接点7、8間の絶縁耐電圧は、図4に示すように改善されている。

(実施形態例3) 図5は、本発明の有極型電磁リレーの第3の実施形態例を示す断面図である。図5において、図1と同じ部材には同じ符号が付してあり、ここでは説明は省略する。図5に示すように、第3の実施形態例では、コイル4と永久磁石2の間の沿面距離を長くするため、コイルスプール3の、永久磁石2と対向するフランジ部12aと、そのフランジ部12aに対向するベース遮蔽部201にテーパー構造を設け、このフランジ部12aとベース遮蔽部201との空隙に、永久磁石2とコイル4を絶縁するための絶縁樹脂封止剤13を充填し、100℃前後の高温で硬化させている。これにより、コイル4と永久磁石2の間の沿面距離は、従来を21単位とすると、本例では、26単位と長くなり、この結果、コイル4と接点7、8間の絶縁耐電圧は、図6に示すように改善されている。

【0015】

【発明の効果】以上説明したように、本発明の有極型電磁リレーは、絶縁体コイルスプール3の永久磁石2を挿入するフランジ部12aにテーパーまたは空隙を設け、この凹部に対向するベース遮蔽部201に凸部201aを設け、かつ、鉄心1の両極のフランジ部12bに凹部または空隙を形成し、この凹部に対向するベース遮蔽部201に凸部201bを設けたことと、さらに、コイルスプール3の永久磁石2と対向するフランジ部12a、*

*と、そのフランジ部12aに対向するベース遮蔽部201にテーパー構造を設け、このフランジ部12aとベース遮蔽部201との空隙に、絶縁樹脂封止剤13を充填し、硬化させたことにより、コイル4と永久磁石2、鉄心1、およびアマチュア5間の沿面距離を長くすることができ、その結果、コイル4と接点7、8間の絶縁耐電圧を増大し、小形かつ低消費電力で、より高耐圧な有極型電磁リレーを提供することができる。

【図面の簡単な説明】

【図1】本発明の第1の実施形態例を示す有極型電磁リレーの構造断面図。

【図2】本発明の第1の実施形態例を示す有極型電磁リレーの絶縁耐電圧図。

【図3】本発明の第2の実施形態例を示す有極型電磁リレーの構造断面図。

【図4】本発明の第2の実施形態例を示す有極型電磁リレーの絶縁耐電圧図。

【図5】本発明の第3の実施形態例を示す有極型電磁リレーの構造断面図。

【図6】本発明の第3の実施形態例を示す有極型電磁リレーの絶縁耐電圧図。

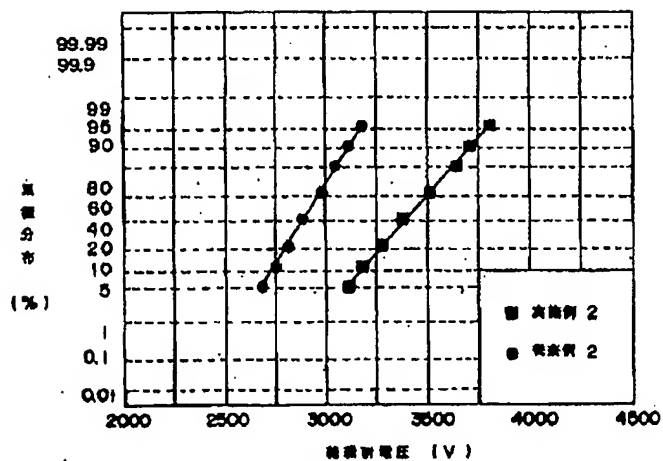
【図7】従来の一例を示す有極型電磁リレーの構造断面図。

【図8】従来の一例を示す有極型電磁リレーの絶縁耐電圧図。

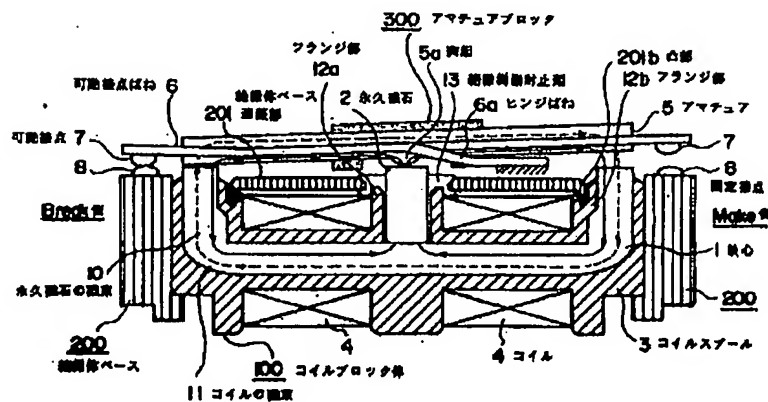
【符号の説明】

- 1 鉄心
- 2 永久磁石
- 3 コイルスプール
- 4 コイル
- 5 アマチュア
- 6 可動接点ばね
- 6a ヒンジばね
- 7 可動接点
- 8 固定接点
- 10 永久磁石磁束
- 11 コイル磁束
- 12a 永久磁石側フランジ部
- 12b 鉄心側フランジ部
- 13 絶縁樹脂封止剤
- 100 コイルブロック体
- 200 絶縁体ベース
- 201 絶縁体ベース遮蔽部
- 201a 永久磁石側凸部
- 201b 鉄心側凸部
- 300 アマチュアブロック

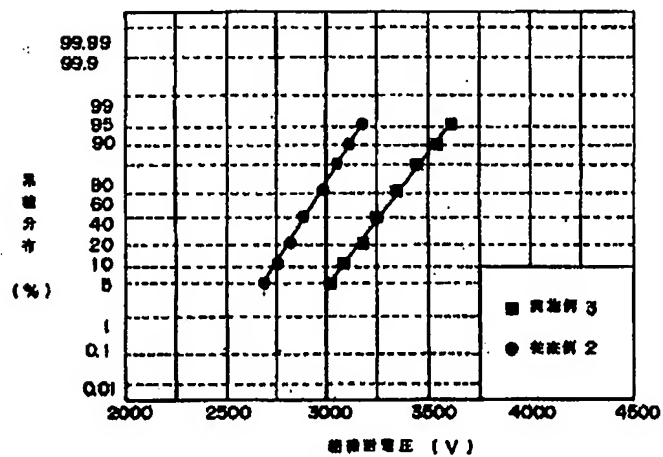
【図4】



【图5】



【図6】



300 アマチュアブロッタ



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